

(No Model.)

3 Sheets—Sheet 1.

L. C. HUSON.  
ROTARY ENGINE.

No. 398,782.

Patented Feb. 26, 1889.

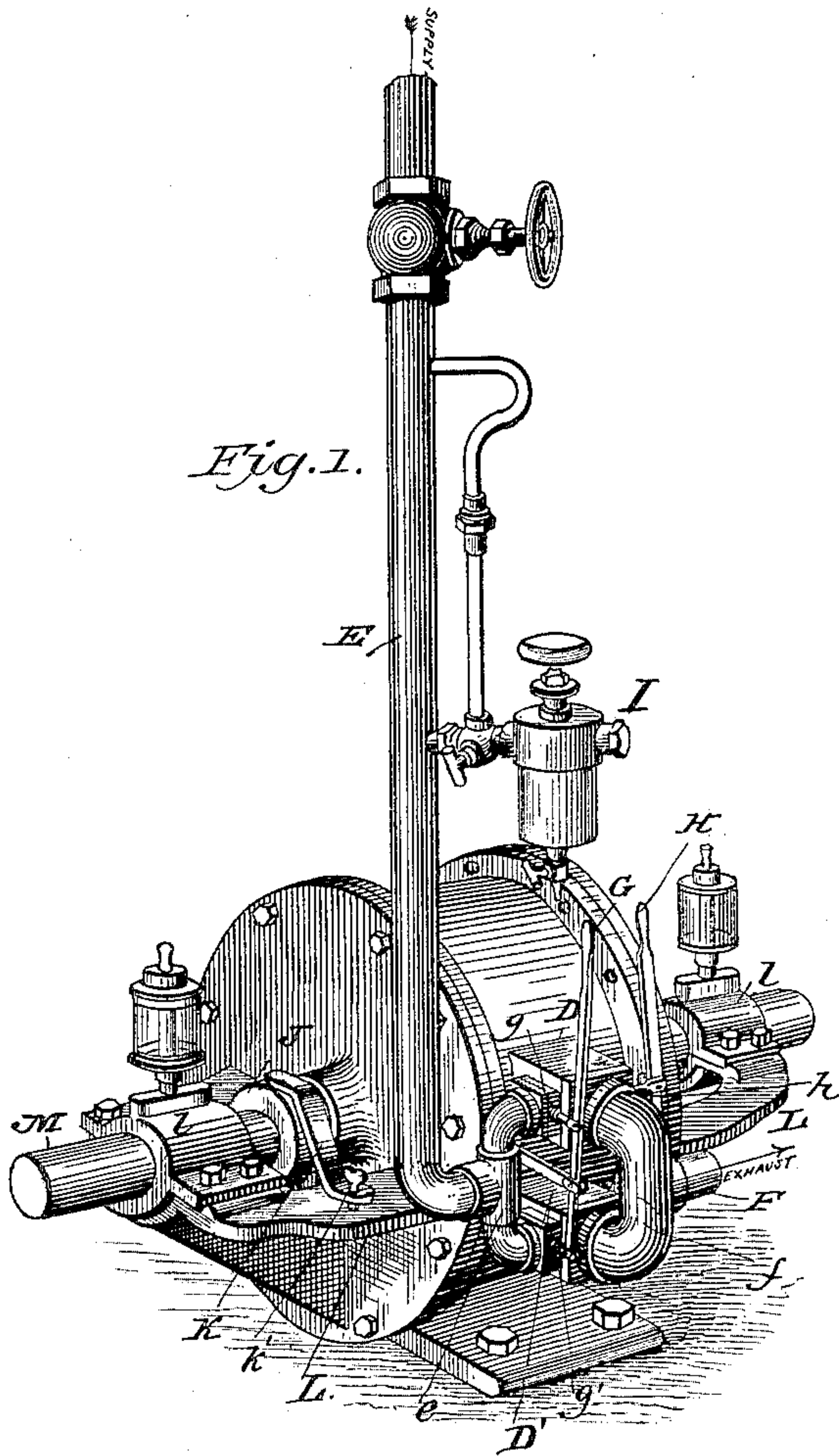


Fig. 1.

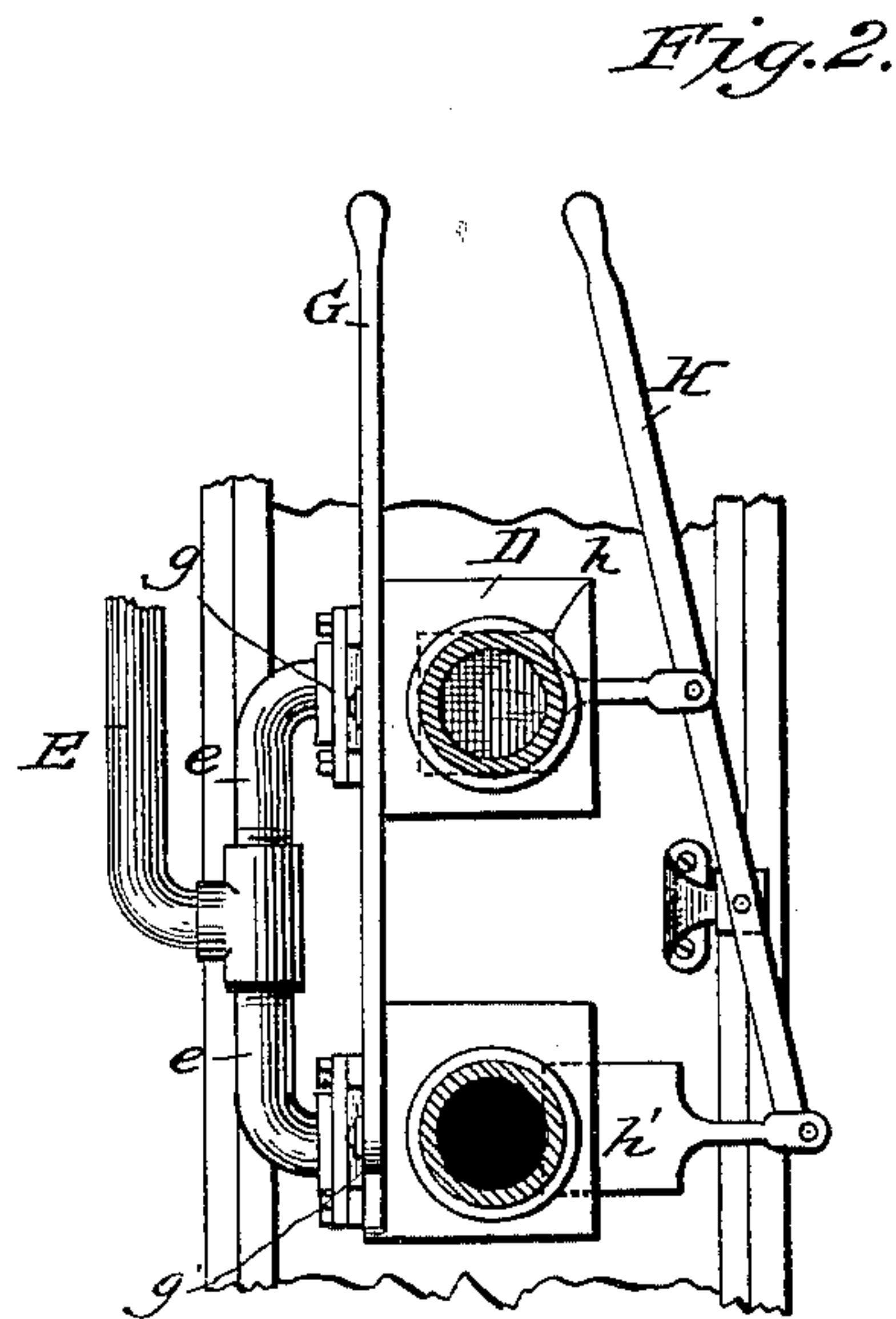


Fig. 2.

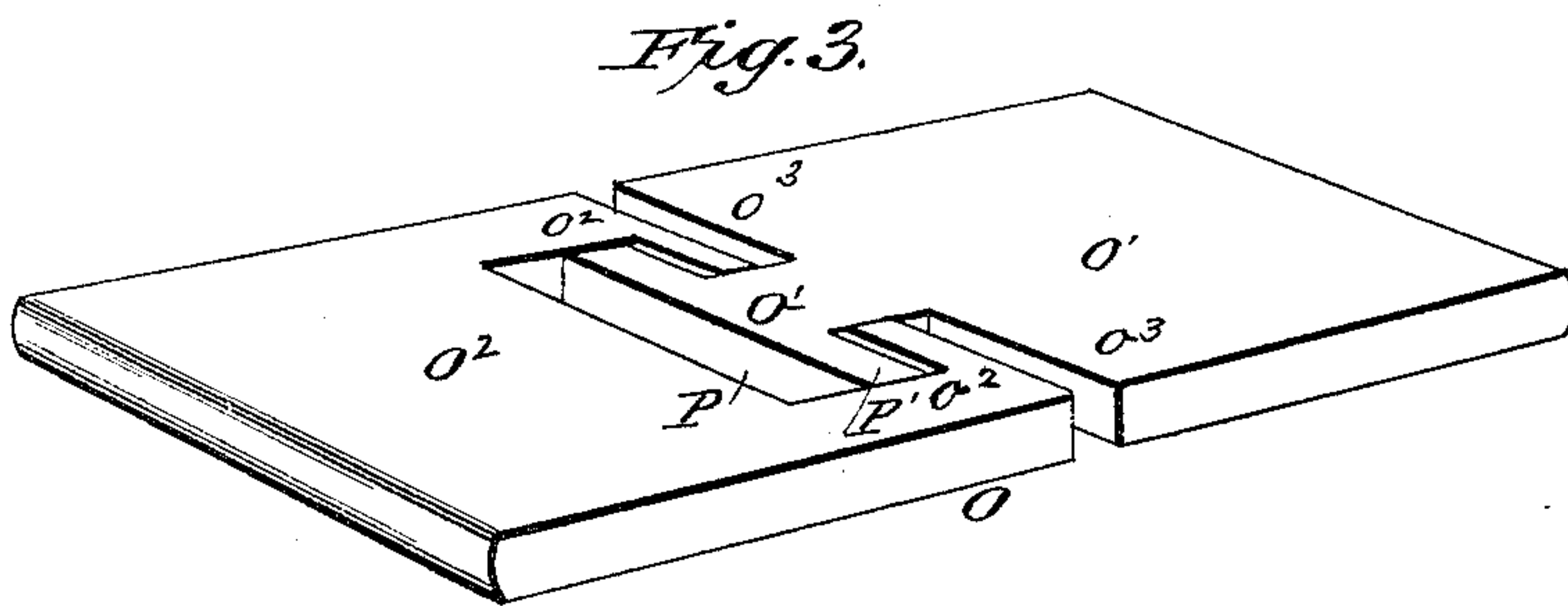


Fig. 3.

WITNESSES:  
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*L. C. Huson*  
BY *Munn & Co*  
ATTORNEYS.



(No Model.)

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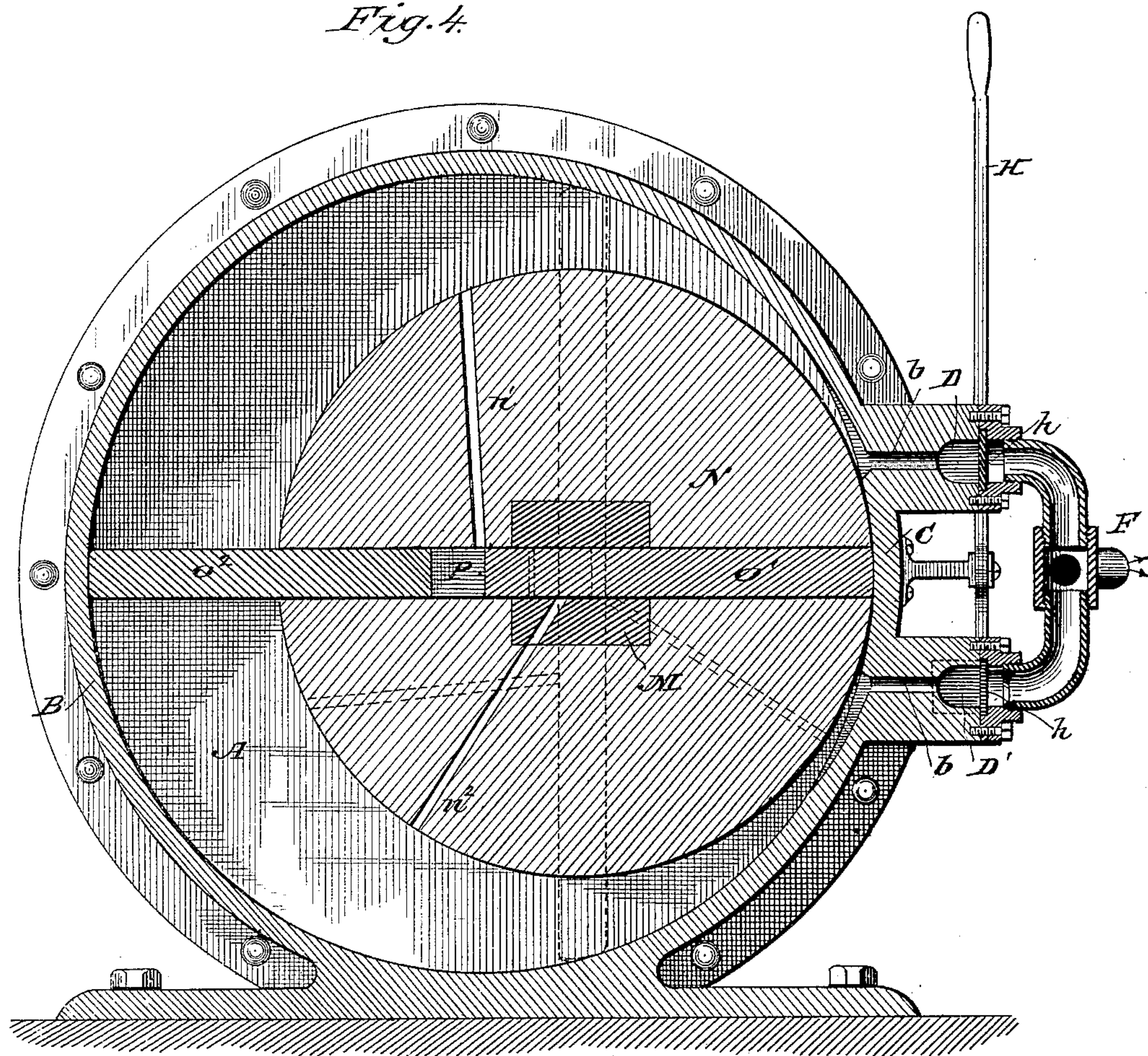
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*Fig. 4.*



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(No Model.)

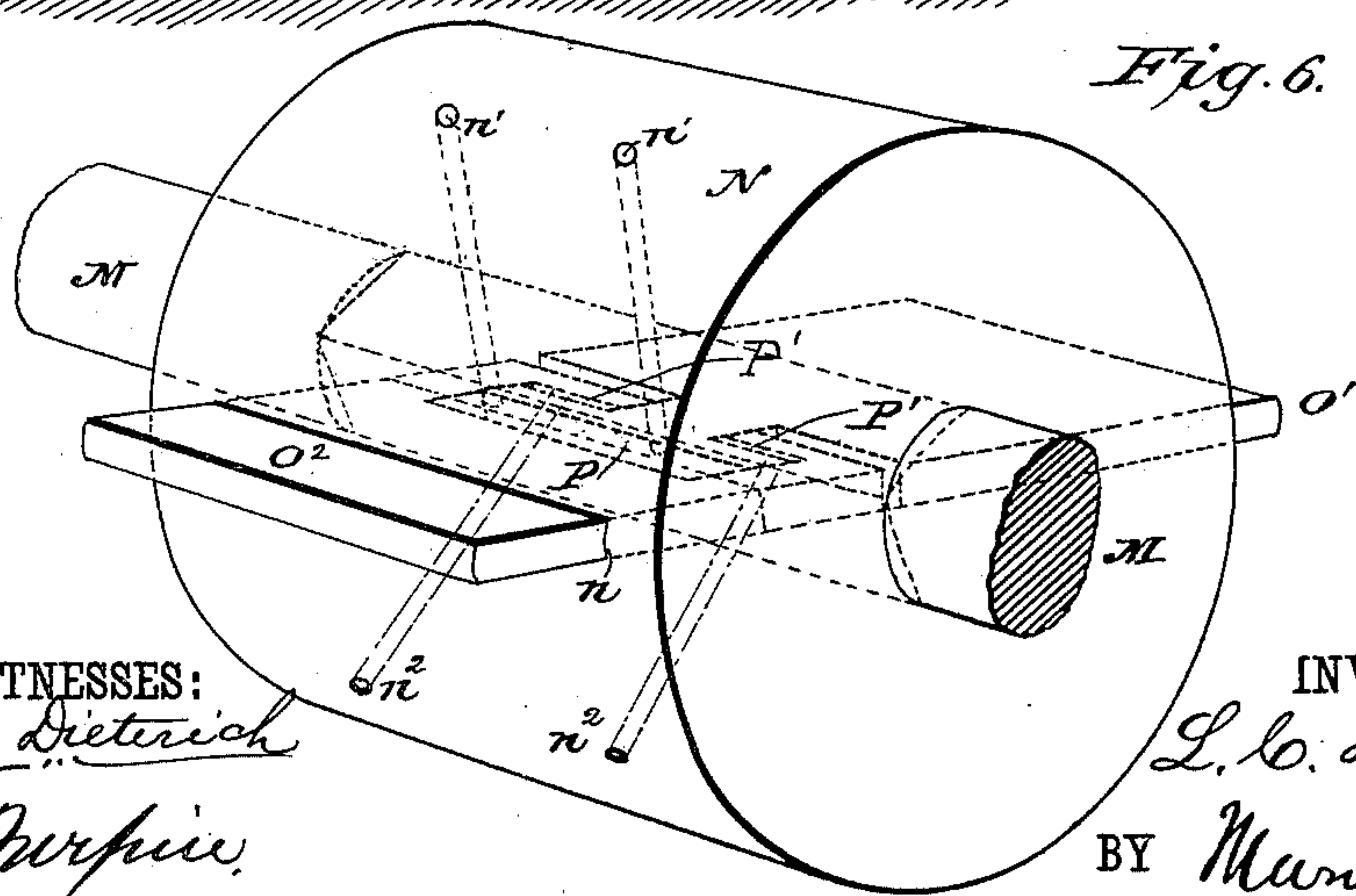
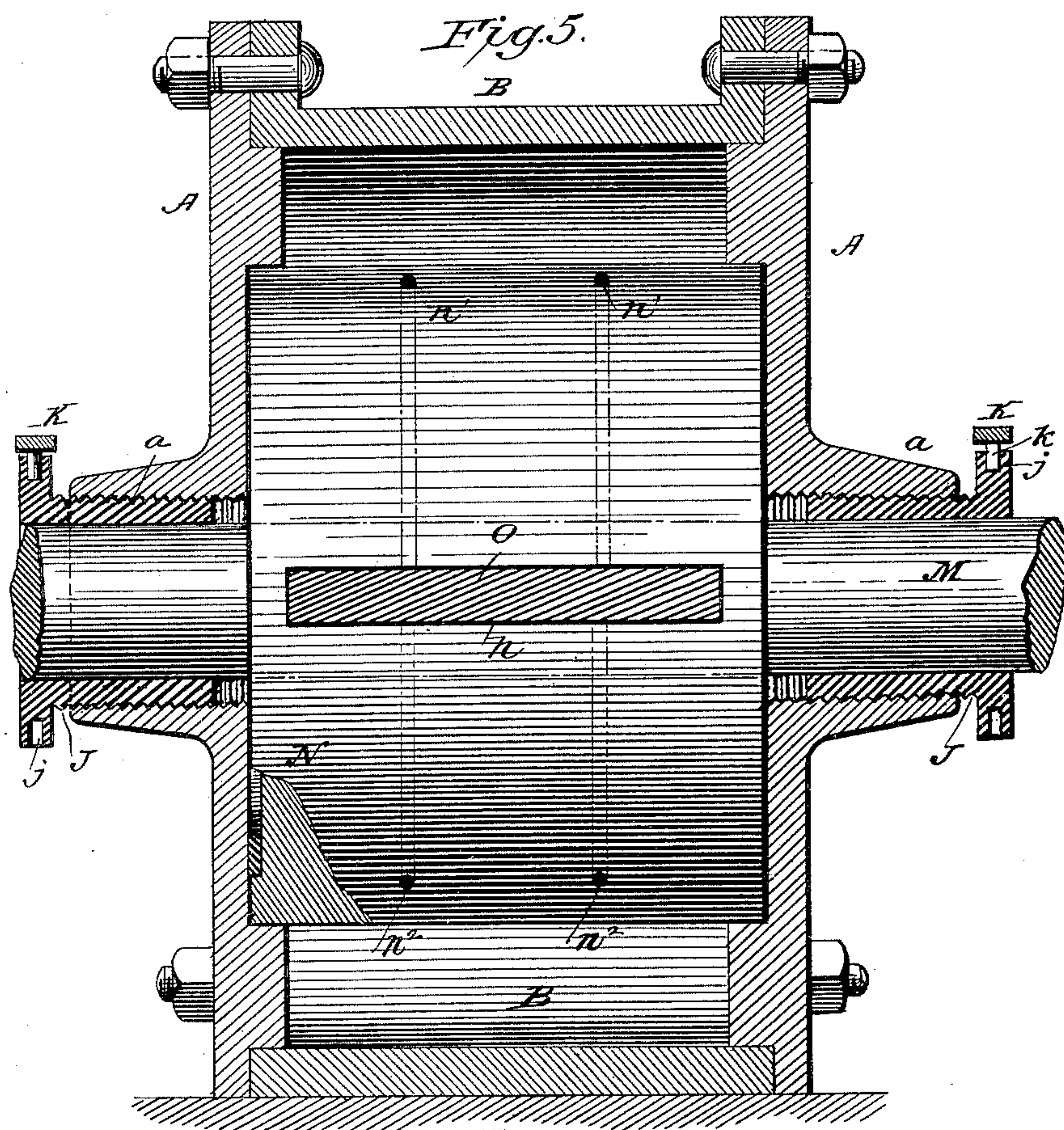
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# UNITED STATES PATENT OFFICE.

LEWIS C. HUSON, OF ELMIRA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO ROMEYN B. AYRES, OF HAMMONDSPORT, NEW YORK, JOHN H. HOSIE, OF SCRANTON, PENNSYLVANIA, AND THE HUSON MOTOR COMPANY, (LIMITED.)

## ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 398,782, dated February 26, 1889.

Application filed March 9, 1888. Serial No. 266,716. (No model.)

*To all whom it may concern:*

Be it known that I, LEWIS C. HUSON, of Elmira, in the county of Chemung and State of New York, have invented a new and useful  
5 Improvement in Rotary Engines, of which the following is a specification.

My invention is an improvement in rotary engines, and seeks to yoke or connect the piston-sections, to arrange the piston steam-  
10 chambers for the steam which operates said sections in and out, so such sections will both be acted on by steam admitted through the same opening or channel, and to provide for the utilization of the steam in drawing the sec-  
15 tions in as well as in forcing them out.

The invention also seeks to provide other improvements, as will be described; and it consists in certain features of construction and novel combinations of parts, as will be here-  
20 inafter set forth.

In the drawings, Figure 1 is a perspective view of my improved engine. Fig. 2 is a detached sectional view showing the exhaust-  
25 valves. Fig. 3 is a detail view of the piston. Fig. 4 is a cross-sectional view of the engine. Fig. 5 is a section of the engine drawn on a line parallel with the shaft, and Fig. 6 is a detail view of the head or drum with the pistons therein.

30 The casing or framing has heads A A and a rim or barrel, B, which latter has steam inlet and exhaust ports *b* arranged on opposite sides of what may be called its "abutment" portion C. These ports *b* are either inlet or  
35 exhaust ports, according to the adjustment of the valves, as will be readily understood, such ports leading into valve-chambers D D', which have ports leading to the steam-supply pipe E, branched at *e* to unite with both chambers  
40 D D' and to the exhaust-pipe F, branched at *f*, so it may also unite with both chambers D D'. It will be seen that I make the exhaust-ports larger than the live-steam ports, as by so doing I avoid all choking of the exhaust,  
45 which, as is well known, operates detrimentally to the working of engines. Valves *g g'*, operating in the chambers D D', control the inlet of steam thereto, and are connected to a lever, G, pivoted between its connection with

the valves *g g'*, so by turning the lever one 50 of the valves *g g'* will be opened and the other closed. Similar valves, *h h'*, are arranged to control the exhaust, and are connected in like manner with a lever, H.

By adjusting the levers G H to open valve 55 *g* in chamber D and valve *h'* in chamber D' the engine may be caused to turn in one direction, and may be operated in the reverse direction by opening valves *g' h*.

A suitable lubricator, I, connects with the 60 steam-pipe E, and so supplies oil to properly lubricate the interior of the engine. The heads A of the casing are formed with openings *a*, threaded to receive the journal-like boxes J, which are threaded to fit the open-  
65 ings *a*, and have their heads or flanges formed with openings or sockets *j*, to receive the projections *k* on the wrenches K, which latter are locked in place when the boxes J have been turned to the desired extent, and so lock  
70 the boxes J from jarring or otherwise becoming loose. To this end I turn screws *k'* through the arms K into the casing or framing, they thus serving as fastenings and operating to lock both parts J and K in position. 75

I provide the casing or framing with the portions L extending usually from the head-plates and form the lower seats for the shafts in said portions L, the shafts being secured by journal-caps *l*, these bearings L *l* being the  
80 main bearings for the shaft, as will be readily seen.

The shaft M has the head or drum N secured on it within the casing. This head N is arranged eccentrically to the cylinder or  
85 barrel B, its rim or circumference moving closely against the abutment C.

A way, *n*, for the piston is formed radially through the head N, and ports or channels *n'* *n'* are formed from the circumference of the  
90 head and intersect the way *n*. The channel *n'* opens at its inner end into the way *n* at about the center of the head, while the opening *n'* opens into the way *n* between the center and the circumference of the head, and the chan-  
95 nels *n' n'* open out of the circumference of the head a distance apart about one-third the circumference of the head. They also open



on opposite sides of one end of the way  $n$ , as clearly shown in Fig. 4. These channels  $n'$   $n^2$  serve to admit steam to the steam-chambers or receptacles in the piston, as will be more fully described hereinafter.

The piston O, preferably formed of brass, operates in the way  $n$ , and is formed in sections O' O<sup>2</sup>, loosely yoked together at their inner ends, whereby they are capable of a limited independent movement. This yoking may be accomplished in various ways; but by preference I effect it by the novel construction of the sections at their inner ends, and I also prefer to so construct the interlocking portions that they will provide chambers in which the steam may act for forcing the sections in and out, and also so that the said chambers will be arranged in such manner that the steam will act equally at the opposite sides of the inner edges of the sections, so that such sections will not be given a greater pressure at one side than the other, and so given a binding tendency within the way therefor. To this end I prefer to construct the section O' with a T-shaped head or portion,  $o'$ , at its inner end, and the section O<sup>2</sup> with L-shaped portions at the opposite sides of its inner end, which portions  $o^2$  lap over and interlock with the head of the T-shaped portion  $o'$ , and thus interlock the sections O' O<sup>2</sup>. This interlocking is effected so that the parts O' O<sup>2</sup> may move slightly independently, and so that a steam-chamber, P, may be provided between the end of portion  $o'$  and the end of the section O<sup>2</sup>, and a chamber, P', may be provided on the opposite sides of the shank of portion  $o'$  and between the head of such portion and those of the portions  $o^2$ , as shown. The inner edges of the heads of portions  $o'$   $o^2$ , being the walls of chamber P', form bearings for the action of the steam, which bearings, as shown, face toward the outer ends of the sections O' O<sup>2</sup>, so that the action of the steam therein may in a measure serve to draw the sections in, so that such sections will not only be forced in by contact with the curved walls of the casing, but will also be given such a tendency by the action of the steam. By this construction I avoid the friction between the outer ends of the piston and the inner surface of the barrel of the casing incident to those engines in which the sections of the piston are forced in by the bearing thereagainst of the casing. This drawing of the sections inward by the action of the steam is an important feature of my invention. When steam is admitted into the chamber P, the sections O' O<sup>2</sup> are forced outward, while the reverse is the case when steam is admitted to the chamber P'.

In operation, when the parts are in the position shown in Fig. 4, steam enters through channels  $n'$  into the chamber P, holding the piston-sections steam-tight against the casing until the piston-section O' shall have been pressed in so far as to close the inner end of channel  $n'$ , when the exhaust-steam, entering

through channel  $n^2$  into chambers P', will serve to draw the sections O' O<sup>2</sup> in, slightly easing their pressure against the cylinder. It will be seen that chambers P P' are neither ever entirely closed, the diameter of the casing being such relatively to the piston-sections as to prevent the latter being adjusted outward so far as to close the chamber P', and the shoulders  $o^3$  of the section O' abutting the ends of portions  $o^2$  before the chamber P can be closed, the entire closure of both chambers P P' being thus prevented. The said chambers P P', being never entirely closed, have, it will be understood, within them at all times during operation steam, either live or exhaust, so that the sections of the piston are balanced between the pressure of exhaust-steam in one chamber and live steam in the other, or adjusted in or out as the pressure in one chamber exceeds that in the other.

By properly adjusting the live steam and exhaust valves, as before described, the engine may be caused to operate in either direction.

By operating the piston-sections in and out by steam action, as before described, the operation of the engine is rendered easier, the friction being largely reduced.

The oil supplied to the steam-pipe in the manner described passes into the casing and keeps the moving parts therein properly lubricated.

Having thus described my invention, what I claim as new is—

1. In a rotary engine, a piston formed in sections having their inner edges constructed to loosely interlock with each other, whereby such sections are connected together, and yet may move to a limited extent independently of each other, substantially as set forth.

2. In a rotary engine, the casing and the head having a way for the piston, combined with said piston fitted to the way and formed of sections loosely yoked together, substantially as set forth.

3. In a rotary engine, the combination of the casing, the head or drum having a way for the piston, and the sectional piston fitted to said way, and having its sections provided at their inner edges with interlapping portions, whereby they are yoked together, substantially as set forth.

4. The combination of the casing, the drum or head having a way for the piston and provided with steam ports or channels intersecting said way, and the piston formed in sections having bearings in advance of their inner ends, such bearings facing toward the outer ends of the piston, whereby steam acting on said bearings may operate to draw the pistons inward, substantially as set forth.

5. In a rotary engine, the combination of the casing, the head or drum having channels  $n'$   $n^2$  and a way for the piston, and the piston-sections O' O<sup>2</sup>, the section O' being provided at its inner end with a T-like head, and the section O<sup>2</sup> having at the opposite



sides of its inner end L-shaped portions engaging the T-head of the section O', substantially as set forth.

5 6. The combination, with the casing and the head or drum therein, of the independent valve-chambers communicating with the casing on opposite sides of the abutment, independent steam and exhaust valves in each of said chambers, a lever connecting the ex-  
10 haust-valve of one chamber with that of the other, and a lever connecting the steam-supply valve of one chamber with that of the other, all substantially as and for the purposes specified.

15 7. In a rotary engine, the combination, with

the head or drum, of the piston-section sliding therein and provided with a bearing arranged and adapted to receive steam-pressure in such manner as to draw the piston-section inward, substantially as and for the purposes specified. 20

8. The combination of the casing, the drum having way *n* and ports or channels *n'* *n*<sup>2</sup>, and the sectional piston constructed to provide steam-chambers P P', substantially as set forth.

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Witnesses:

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